Math 1A Midterm 1 2009 Sept 29 12:30pm-2:00pm

You are allowed 1 sheet of notes. Calculators are not allowed. Each question is worth 3 marks, which will only be given for correct working and a clear and correct answer in simplified form. Write the final answer to each question on the cover-sheet, and attach the cover-sheet to your bluebook.

1. Sketch the graph of $y = |x^2 - 2x|$ for $-4 \leq x \leq 4$.

2. Sketch the graph of the function $f(x) = (4x - 1)/(2x + 3)$. Find a formula for its inverse f^{-1} and sketch the graph of f^{-1} on the same plot.

3. Evaluate the limit
$$\lim_{x \to 4} \frac{2 - \sqrt{x}}{4x - x^2}$$

4. Show that there is a number x such that $e^x + \sin(x) = 5$.

5. What is
$$\lim_{x \to +\infty} \sqrt{x^2 + 3x} - \sqrt{x^2 + 2x}$$

6. Find the equation of the tangent line to the curve $y = 2x^3 - 5x$ at the point where $x = -1$.

7. State the definition of the derivative of a function, and find the derivative of the function $f(x) = x^2 - 1$ using the definition of the derivative.

8. Sketch the graph of a function whose derivative is $\arctan(x)$.

9. Differentiate the function $y = e^{x+1} + x^{-10}$.

10. Differentiate $e^x \sqrt{x}$.

11. Differentiate
$$\frac{e^x}{x^2 + 1}$$